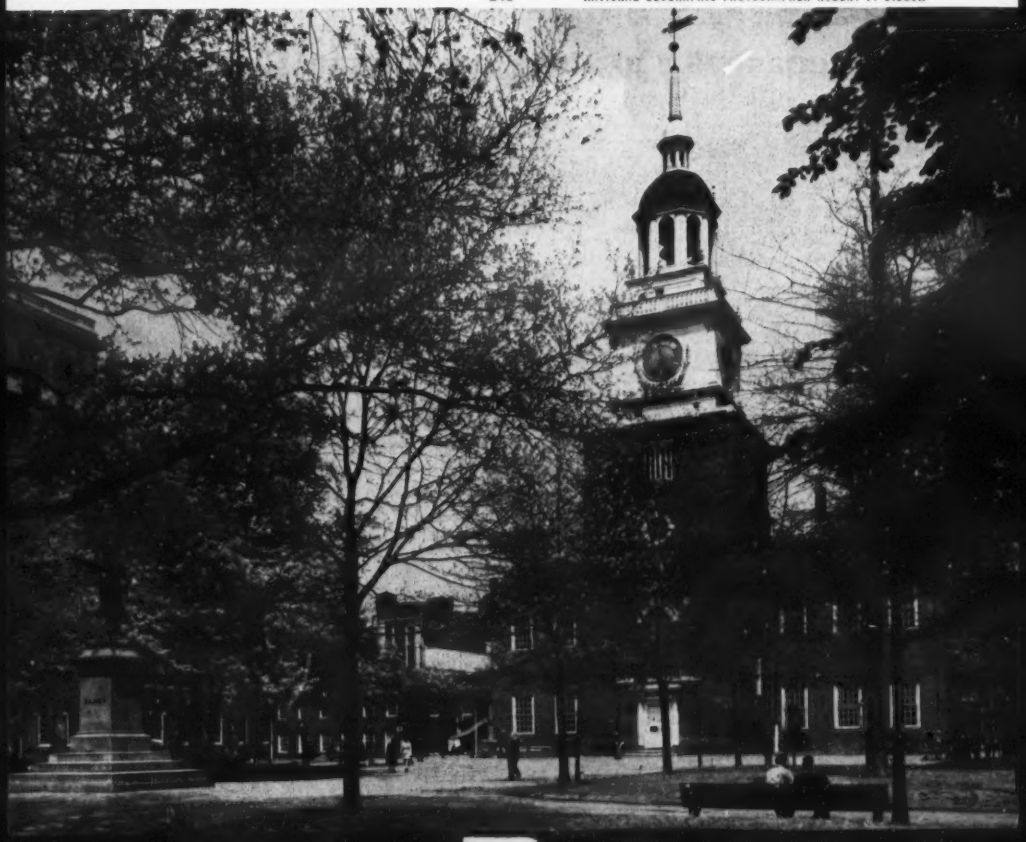
GEOGRAPHIC SCHOOL BULLETINS

OF THE NATIONAL GEOGRAPHIC SOCIETY, WASHINGTON 6, D.C.

MARCH 5, 1956 VOL. XXXIV, NO. 21

PHILADELPHIA'S POCKET OF HISTORY—Independence Hall's Cupola Overlooks Other Buildings of Independence Square, Quiet Monument Within a Surging Metropolis

241 NATIONAL GEOGRAPHIC PHOTOGRAPHER ROBERT F. SISSON



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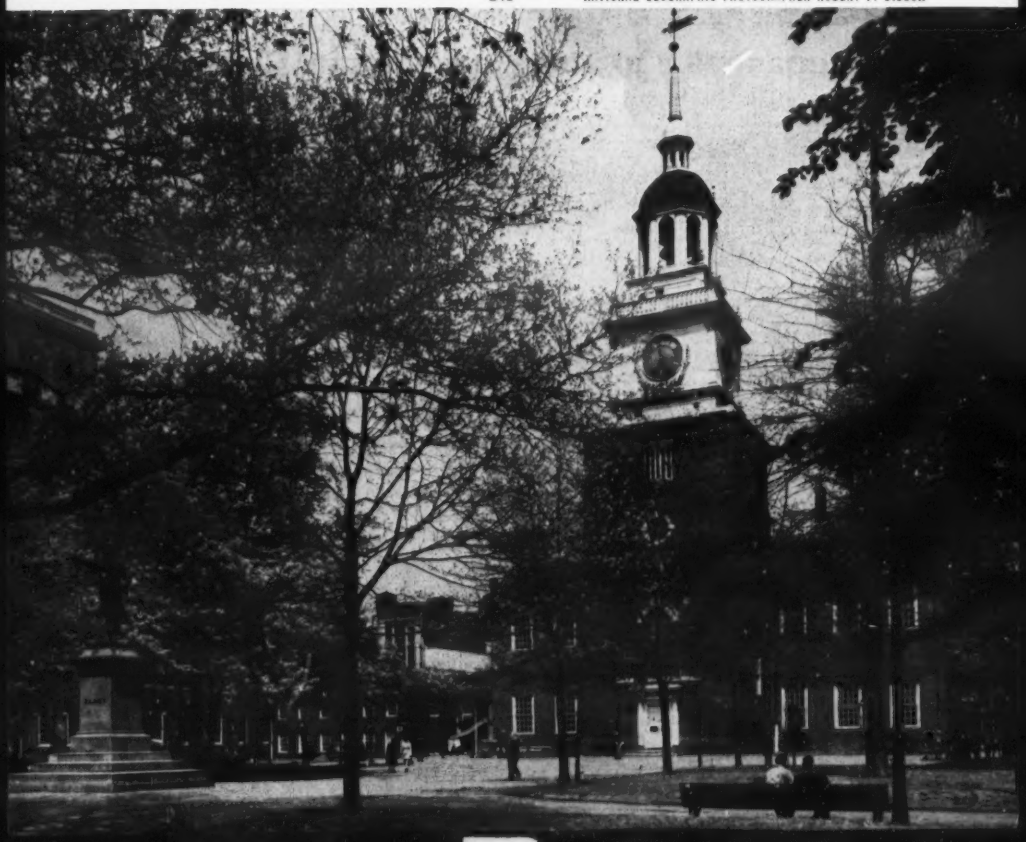


near Scranton. Passing these areas, the Susquehanna River, snaking southward and draining nearly half the state, becomes stained with coal sediment. Once "useless black rock," this coal fills practically all the United States demand for anthracite, or hard, coal.

Standing at the state capital, Harrisburg, slowly survey Pennsylvania, bigger or richer than many an independent nation. Long Appalachian ranges sweep diagonally across it, northeast to southwest. Factory smoke hangs over valley towns where mountain-crossing pioneers paused, took root, and were passed by the next wave of frontiersmen. Wooded slopes abound with more game than when Charles II granted "Penn's Woods" to William Penn in 1682.

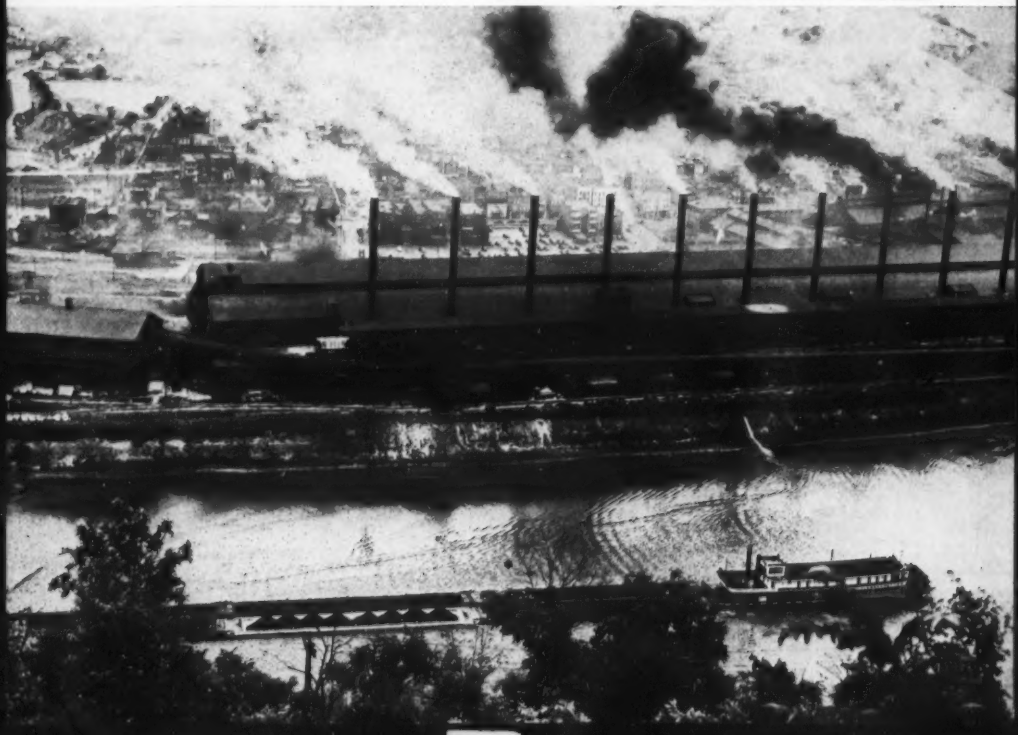
Westward, mountain tops flatten into a deep-scarred highland, the Allegheny Plateau. Miles away to the northwest it shelves to Lake Erie's shore—to the corridor of land that gives Pennsylvania access to Great Lakes commerce. There stands Erie, a lake port surrounded by flat, midwestlike farmlands where fruit and vegetables thrive.

Below Erie the Allegheny River corkscrews southward to join commerce-heavy Monongahela, much-disputed waterway of French and Indian fighting. They form the Ohio, tawny link with the Mississippi and Gulf of Mexico. At the junction, noted by young George Washington as a likely fort site, mighty Pittsburgh bristles with steel mills.

Pennsylvania hums with some 50 major industries, leading the United States in the production of steel, pig iron, stone, cement, coal, and coke. During the Revolutionary War, its colonial forges supplied arms and

MILL-FLANKED MONONGAHELA—Canoes Once Skimmed Where Coal Barges Churn

STANDARD OIL COMPANY OF NEW JERSEY



Pennsylvania, A Keystone of Production

Step into the picture above and stand on the rich soil of a Pennsylvania-German farm. Green acres, heavy with crops, roll away ahead of you through York and Lancaster counties, fertile farming belt of the Piedmont. To the left lies bloodstained Gettysburg, gaining new renown as President Eisenhower's home. Giant Philadelphia, still officially third-largest United States city, sprawls off the picture to the right.

Stride to the Delaware River bank and feel the throbbing pulse of William Penn's City of Brotherly Love. Sense the shrinelike stillness that surrounds tree-shaded Independence Hall (cover). Because Pennsylvania stood in the center of the long line of 13 British colonies, it was the natural, most convenient meeting place for delegates who drew up the Declaration of Independence in this building, for others who wrote the Constitution. Near by lived Benjamin Franklin, Pennsylvania's adopted son, whose 250th birthday is being honored this year by 40 free nations.

Central position in the arc of original states gave Pennsylvania its "Keystone" nickname. It stands for as much now. Take Pennsylvania out of the Union and the 47 other states would feel the loss of its industries and raw materials. To glimpse this state's importance, move northward to the Lehigh Valley, the Lackawanna River, the Wyoming region

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Extinct!

Who, Me?

This bright-eyed little fellow ranks among the most sociable of all mammals. He's a prairie dog, chunky, gray-brown member of the ground squirrel family, who enjoys company so much that he lives in "towns."

Once communities consisting of hundreds of burrows were a common sight to Great Plains settlers. One prairie dog colony spread from western Kansas to Colorado—about 100 miles.

Prairie dogs dig burrows straight down 12 or 14 feet, then often level off to form an L-shape tunnel. Rooms connect with the main corridor—bedrooms, storerooms, other specialized chambers. Each shaft is topped by a "chimney"—a built-up mound which bars floodwaters from pouring down the hole.

J. W. JACKSON

A hundred years ago an entire colony would take the air on bright days, each prairie dog perching on his chimney with his family, gossiping with neighbors. Upon meeting, two friends often kiss, rub each other's fur, sometimes share food.

Eating habits brought them disrepute with farmers. Prairie dogs munch grasses—with a special fondness for alfalfa—and succulent roots. Their gravelly chimneys dull cutter-bars of mowing machines, their tunnels are leg-breaking traps for unwary horses and cattle.

Labeled pests, prairie dogs felt man's wrath. Guns and poison nearly wiped them out. But in certain refuges they still sun themselves, storing food, alert for enemies like snakes and burrowing owls. When Lewis and Clark encountered them on their trek across the continent, they reported that the dogs "make a Whistleing noise." These shrill, barklike warnings gave them their name.

WALTER MEAYERS EDWARDS, NATIONAL GEOGRAPHIC STAFF

PENN'S WOODS Still Cover Nearly Half the State, as on These Susquehanna Slopes

ammunition to Washington's army, while farmers trundled to Valley Forge with wagonloads of grain for half-frozen Continentals. In Franklin's day, linen was a prize product of Philadelphia. Now the city and its environs teem with some 1,650 textile and apparel mills.

Pennsylvania oil descends from the nation's first well which gushed at Titusville, south of Erie, in 1859. Two memorable items sprang from peaceful Lancaster County. Swiss and German settlers, known as Pennsylvania Deutsch ("Dutch"), brought the art of fashioning long-barreled, deadly-accurate rifles. Conestoga carpenters also built sturdy wagons, sway-backed to keep loads from spilling on steep grades. The Pennsylvania rifle, later adopted by Kentucky, and the Conestoga wagon played vital parts in opening the nation's west.

Germans are only one element of diverse European peoples who helped build the state. Henry Hudson nosed his Dutch ship up the Delaware in 1609. A French explorer scouted the Susquehanna four years before Pilgrims landed in New England. Legends tell of Spaniards visiting the state earlier still. Swedes and Dutch built cabins along the lower Delaware long before William Penn arrived. Welshmen left names like Bryn Mawr. Poles, Italians, and others swarmed into mining and industrial regions to dig coal and forge steel. Pennsylvania, world's workshop, has given them all a place in this nation within a nation.

National Geographic Magazine—July, 1950, "Down the Susquehanna by Canoe"; Oct., 1952, "Pennsylvania Dutch Folk Festival"; July, 1948, "Artists Look at Pennsylvania"; July, 1949, "Pittsburgh: Workshop of the Titans" (75¢ each)

ago, Society photographers took the world's first underwater color pictures, using a cumbersome process that required long exposures and a pound of magnesium flash powder for each underwater shot. Luis Marden, with twin watertight lamps, stopped most fish motion with 1/100-second exposures. The *Calypso* also tested the latest undersea camera, able to withstand pressure at the greatest-known ocean depth—35,640 feet. It was developed, with Society support, by Dr. Harold E. Edgerton of Massachusetts Institute of Technology.

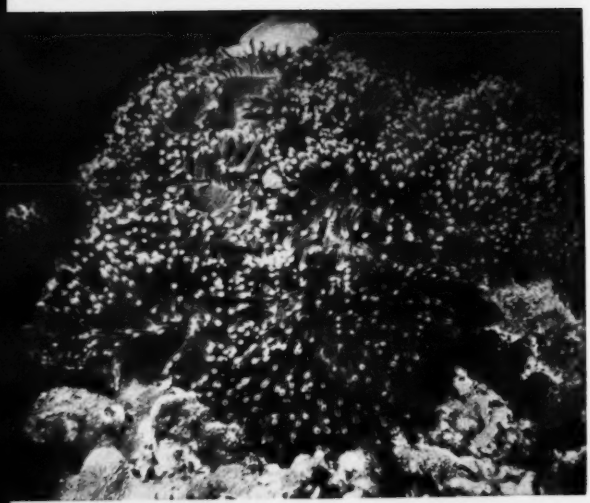
Weird deep-water inhabitants appear in these photographs. The nearly round surgeonfish (upper left) carries a razor-sharp lancet at the base of its tail. Raising its spine, it gashes enemies. It seems to be diving into a colony of sea anemones. The waving tentacles of this fish-eating, plantlike animal wait for smaller prey.

To the fish, the strangest monsters of all are humans—like this group of Cousteau's "aqua-men" flippering under the Equator (above). But man's sunken ships have become familiar hunting grounds for deep-sea prowlers like the brilliant angelfish (right), nosing around the ship's bell of a freighter bombed in World War II. Gold and black butterflyfish (lower right) wind through polyp-covered coral and live sponges.

Cameraman Invades Fish World

Photographs by Luis Marden, National Geographic Staff

PIERRE GOUPIL



BENEATH the surface of the Indian Ocean a 30-pound jack turns haughtily from the creature who has invaded his domain (above). The "man-fish" is Luis Marden, National Geographic staff, one of the world's top underwater photographers.

Diving with an Aqualung, his wrists strapped with waterproof watch and depth gauges, Marden used hand-held submarine cameras and lights to take the other photographs on these pages. With many others they appear in full color in the Feb., 1956, *National Geographic Magazine*. He worked from the *Calypso*, the French vessel which has carried Capt. Jacques-Yves Cousteau to fame as an undersea explorer.

Marden modified his color camera to record even more than a diver can see. At depths below some 50 feet, vistas lack all colors but blue and green. Marden's filters and artificial lighting restored lost reds and yellows. His Leica peered through a correcting lens which straightened out distortion. Since objects viewed beneath the surface look bigger and closer than they really are, Marden used wide-angle lenses to get them back in proportion.

Marden's work on the National Geographic Society-*Calypso* expedition carried on The Society's tradition of pioneering in submarine photography. Some 30 years

plastic supports the emulsion and other thin layers. When you click your camera shutter, light flashes through the lens and strikes the microscopic silver grains. They grasp and hold the image you see in your camera's view finder. During development, the lighter parts of the image become the dark parts of your negative.

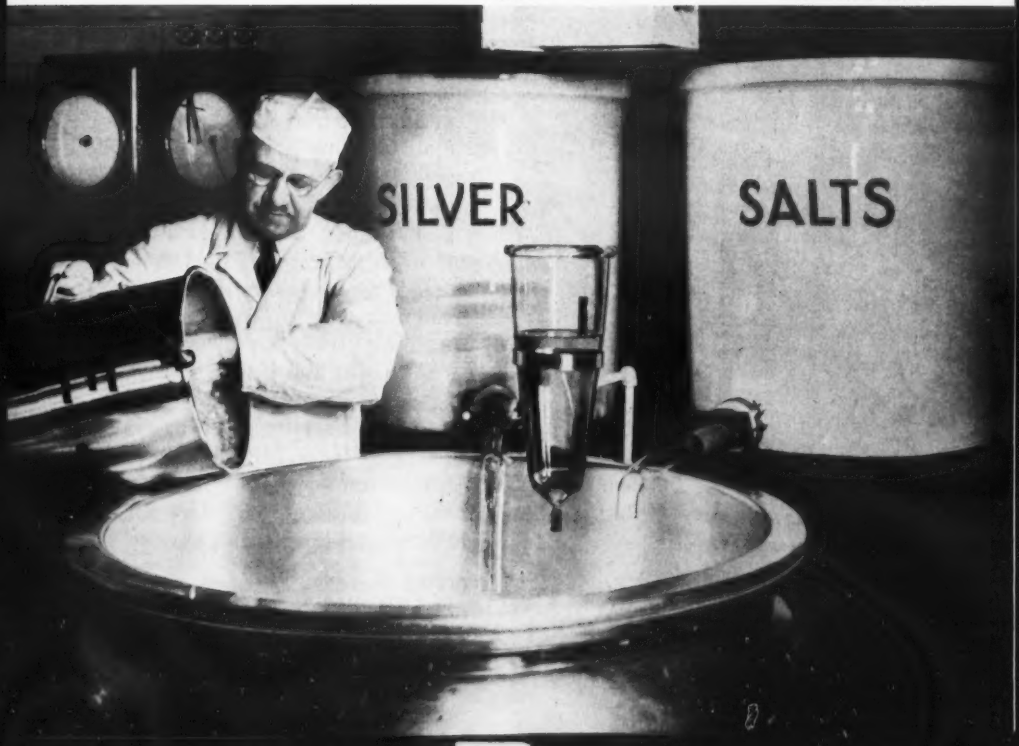
Every week one American film manufacturer, Eastman, uses 13 tons of almost-pure silver—most of it from mines in Mexico and Canada. White-uniformed workers who look more like doctors than film technicians prepare it for coating film in tiled, hospital-like laboratories. Some work in totally dark rooms where a stray shaft of light could ruin thousands of dollars worth of film. Slitting machines cut huge cylinders of film into 85 sizes for smaller rolls varying from one-and-three-eighths-inch width to mammoth aerial films about 18 inches wide.

Then film and its protective paper backing whirl through spooling machines onto neatly packed rolls, held tight by the maker's seal. Other parts of the clinically-clean plant package sheet film, the kind most press photographers use, and motion-picture film that may flash a movie before your eyes in a few months.

A large part of the more-than 2,000 different sizes and types of film flows to camera stores and drug counters. Eventually, most of it winds into cameras of about a million amateur photographers who snap many of the one and a half *billion* black-and-white pictures taken in the United States every year.

FILM FOUNDATION—Workers Dump Silver Nitrate, Potassium Halide Salts, and Gelatin into Giant Mixing Bowls to Give Film Its Coat of Light-Sensitive Emulsion

EASTMAN KODAK COMPANY



Everyday Wonders, No. 6

FILM

NATIONAL GEOGRAPHIC PHOTOGRAPHER WILLARD R. CULVER

A narrow, flexible strip of film—not much heavier than a piece of paper—can take you soaring high above the earth or flapping rubber fins beneath the sea with National Geographic staffman Luis Marden (see pages 246-247). You can watch a Bengal tiger claw a blue nilgai in India's steaming jungles or see a brilliant Hawaiian sunset.

You might say it's done with mirrors. For, in a way, that's what film is. But, unlike a mirror, film doesn't simply reflect images. It catches them and locks them in. Through film, all your friends can thrill to the spectacle of a waterfall just as you saw it on last summer's vacation. Yet you bought the little paper-backed spool of magic with no more thought than you would have given to asking for a candy bar.

Before you finally saw your vacation come alive in photographs, someone had to process your film in chemical solutions. Hundreds of rolls of film exposed by National Geographic photographers traveling all over the world must be developed by laboratory technicians like the one shown here. Perhaps you did the processing in your own home darkroom. If you did, you saw scenes and people gradually appear under the dim safelight as you seesawed the shiny strip in developing trays. Your film then became a negative, a pattern from which one, or 1,000, prints could be made on photographic paper.

Gold-seeking alchemists stumbled onto the secret of film in the 16th century, just as they later accidentally discovered the basis for matches, another Everyday Wonder (GEOGRAPHIC SCHOOL BULLETINS, Nov. 28, 1955). Trying to turn common materials into gold, some experimenters splashed silver nitrate on their hands. When they went outdoors, sunlight turned the chemical black. Today's film, made like a layer cake, reacts the same way.

The "frosting," or face of the film, is called emulsion, a mixture of light-sensitive silver salts and gelatin. A flexible, transparent base of

W. ROBERT MOORE, NATIONAL GEOGRAPHIC STAFF

Planters Found Beauty, Terror in Kenya Highlands

Find a place to park on Nairobi's Delamere Avenue (above) and you may clash bumpers with Ernest Hemingway, Robert Ruark, a Walt Disney cameraman, a National Geographic Society field man. Yet little more than a half-century ago this thriving metropolis, capital of Kenya, Britain's Crown Colony on the Indian Ocean, was a raw railway camp.

Surveyors laying out a line from Mombasa on the coast inland to Lake Victoria were impressed with the beauty and fertility of apparently unoccupied highlands. Word went out that east Africa held luxuriant valleys and spacious pastures for adventurous souls who wished to exchange Britain's crowded towns and small farms for wide-open spaces.

Settlers followed railroad men. They found pasture for sheep and cattle. Wide fields seemed to await the plow. They saw lakes cupped in the Great Rift Valley, and marveled at the 17,040-foot tip of Mt. Kenya where shimmering glaciers nearly touch the Equator.

Farms prospered and white settlement boomed to about 30,000. Many settlers have come since World War II. Rich plantations produce coffee and sisal. Kenya grows about 13,000,000 pounds of tea a year.

But white pioneers, enthusiastic over the possibilities of this new land, were ignorant of the fact that they were intruders. For centuries

WINDING FILM ON SPINNING SPOOLS
White-Clad Operators in Darkened Rooms Join Film to Protective Paper Backing

Large sensitized plates help astronomers, like those at Palomar Observatory, map the universe, recording stars invisible to the human eye. Scientists aim cameras through microscope tubes to keep film notes on cellular functions the same way detectives photograph shreds of cloth or tiny dust particles found at the scene of a crime.

On your next trip to the dentist, a piece of X-ray film may tell you about a cavity that even your dentist didn't know about. Your family doctor may suggest a chest X-ray every year to help you guard against tuberculosis. Medical specialists use film to "see" inside our bodies.

NATIONAL GEOGRAPHIC PHOTOGRAPHER BATES LITTLEHALES

NATIONAL GEOGRAPHIC PHOTOGRAPHER DAVID S. BOYER

In a similar way, infrared film lets us take pictures in the dark. And a new, extrasensitive film permits indoor pictures without special lighting.

Because so much can be crammed on a tiny piece of film, libraries and government agencies photograph cumbersome records and books that would take hundreds of times as much storage space.

ACRES OF FACTS IN FILM NUTSHELLS

Girl checks Alexander Graham Bell's priceless notes, photographed on a roll of 35mm microfilm. Even smaller, the adjoining thumb-size Minicard is still being perfected. This tiny film records 6 legal-size papers above an elaborate code pattern for rapid sorting. A cubic foot of space holds 200,000 Minicards—information that would require about a hundred standard four-drawer file cabinets

W. ROBERT MOORE, NATIONAL GEOGRAPHIC STAFF

WAKAMBA HIGHLANDERS DANCE, Chanting to the Thump of Hand-Beaten Drums

Kenya's tribesmen—Kikuyu, Wakamba, Masai—had roamed the land, farming many plots, then moving on. They considered their own every little garden spot once cultivated by their crude hoes.

British settlers tried to straighten out land ownership, paying tribesmen for some areas, allotting specified lands to them. Many natives adopted white ways, learning to read and write English, to use modern farm equipment. Some went to British universities and returned home to become teachers, government clerks, even lawyers.

But one group simmered with discontent for years. Egged on by communists, they formed a secret society, the Mau Mau. Aiming to drive the white man out of Kenya, they raided plantations, killed white people and many natives who would not join them.

For more than three years they have terrorized the land. Now they are all but beaten. Through the damp, green dusk of Kenya's bamboo forests, government patrols silently follow any trace that may lead to a Mau Mau hiding place. Thousands of terrorists have been rounded up.

The uprising changed Kenya life. Many tribesmen settled down in villages—clusters of huts protected by stockades and ditches. As security gradually returns, the old native habit of roaming seems to be giving way to settled farming.

National Geographic References: ***Map***—Northern Africa (paper 50¢, fabric $1)
Magazine—Mar., '50, "Britain Tackles the East African Bush" (75¢)
Bulletins—Oct. 18, '54, "The Proud Masai, Cattle Kings of Kenya" (10¢)